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File Test Section, Infantry Board

REPORT

of

The Infantry Board

No. 1425

BROWNING MACHINE GUN, CALIBER .30 M1919A4
MODIFIED WITH BIPOD AND SHOULDER REST.

FORT BENNING, GEORGIA

December 14, 1942.

24725—Benning, Ga., 9-16-42—2,000

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IB-472.6

December 18, 1942.

SUBJECT: Browning Machine Gun, Caliber .50, M1919A4, Modified with Bipod and Shoulder Rest.

TO: Chief, Ground Requirements Section, Army Ground Forces, Army War College, Washington, D. C.

1. The Infantry Board concurs with the Discussion and Conclusions of the Test Section as contained in Sections VI and VII of the attached Report of Test.

2. The Infantry Board recommends the alterations and modifications listed in paragraph 2, Appendix "B".

For the President:

N. J. GUNNER,
Colonel, Infantry,
Director.

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REPORT of TEST

TEST OF BROWNING MACHINE GUN, CALIBER .30, M1919A4, MODIFIED WITH BIPOD AND SHOULDER REST

TEST SECTION
THE INFANTRY BOARD
FORT BENNING, GEORGIA

Submitted to
THE INFANTRY BOARD

Copy No. 4 **Date** December 11, 1942

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I AUTHORITY AND REFERENCES

1. Letter, Ground Requirements Section, Army Ground Forces, November 16, 1942, (GNRQT-11/28321) with one indorsement. (Appendix "A").

2. Report of The Infantry Board No. 1155, "Bipod and Shoulder Rest for Light Machine Gun, M1919A4."

II PURPOSE OF TEST

3. Directive letter (Paragraph 1 above) states

"3. Upon receipt of the subject Guns, it is desired that necessary tests be conducted to determine whether these guns are suitable for service as modified."

III PERSONNEL

4. Captain William J. Wade, Infantry, The Infantry Board, conducted the tests and prepared this report.

IV INTRODUCTORY INFORMATION AND DESCRIPTION OF PROJECT TESTED

5. a. Original tests of subject gun in its earliest development stages were reported upon in Report of Test No. 1155, October 3, 1940.

b. Development was continued and in Report of Test No. 1260, July 2, 1941, it was recommended that the M1919A4 machine gun be equipped with bipod and shoulder rest.

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g. On August 17, 1942, The Infantry Board recommended that accomplishment of the modification to the M1919A4 be expedited.

h. Quoting 1st Indorsement by Ground Requirements Section, Headquarters Army Ground Forces, dated September 17, 1942.

* * * * * * * * * * *

"2. On September 17, 1942, the weapon was presented to a sub-committee of the Ordnance Technical Committee, which took the following action.

a. Immediate adoption and procurement of the features - bipod, shoulder stock and carrying handle was recommended."

* * * * * * * * * * *

i. On September 16, 1942, The Infantry Board recommended that the modified M1919A4 be substituted for the M1917A1 Heavy Machine Gun in the Heavy Weapons Companies of the Infantry Regiment.

j. On November 25, 1942, production samples of the subject gun were received and expedited tests conducted. Directive was answered by letter on November 29, 1942. (See Appendix "B".)

6. a. The subject gun is an M1919A4 light machine gun with the following changes:

(1) Light barrel,
(2) Muzzle plug eliminated,
(3) Shoulder rest, detachable,
(4) Bipod, similar to that used on BAR,
(5) Secondary fixed bipod with short legs, which may be used when large bipod legs are folded back in carrying position.

7. a. One of the two guns submitted for test was altered by the Test Section to include the following changes:

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(1) The bearing sleeve on the barrel was replaced by one which projected through the front bearing 1/2 inch and which was slotted to receive the combination tool. The ends of this sleeve were rounded with a 3/16" radius to eliminate the sleeve catching in the bearing. The slots were provided so the barrel could be removed without "stripping" the gun. (See Appendix "C".)

(2) The heads of the bipod legs were changed to give a positive lock when folded back for carrying. (See Appendix "D").

b. The following tests were made with both the gun as received and as altered.

V DETAILS OF TESTS

6. Test No. 1.

a. Purpose: To determine the accuracy of the subject gun:

b. Method: The gun as received was fired off the shoulder and from the M1917A1 tripod. The gun as altered was fired off the shoulder and from the M2 tripod for the light machine gun.

c. Results:

(1) Gun as received; Range 1000 inches: M1917A1 tripod mount; shoulder rest and bipod on gun; 50 shots in 10 shot bursts.

	Max. Spread	Max. Horiz.	Max. Vert.
	2.48	1.37	2.12
	1.15	.55	1.18
	2.21	1.70	1.73
	1.81	.97	1.62
	3.50	1.22	2.84
Average	2.24	1.16	1.89

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(2) Gun as received; Range 1000 inches; M1917A1 tripod mount; shoulder rest and bipod removed; 50 shots in 10 shot bursts. (Note: This test was conducted to determine the effect of the shoulder rest and bipod when the gun was fired from the tripod.)

	Max. Spread	Max. Horiz.	Max. Vert.
	1.80	1.43	1.22
	1.95	1.87	1.34
	2.75	2.75	1.48
	1.96	.91	1.58
	1.87	1.55	1.84
Average	2.21	1.69	1.33

(3) Gun as received; Range 1000 inches; off shoulder; 50 shots in 5 shot bursts.

	Max. Spread	Max. Horiz.	Max. Vert.
	2.52	2.80	2.65
	2.05	2.12	1.71
	1.78	1.73	1.23
	2.12	1.98	1.45
	1.60	1.41	.93
	2.16	2.43	1.68
	1.30	.35	1.08
	2.67	2.53	1.00
	1.82	1.62	1.15
	1.97	1.95	.63
Average	2.22	2.11	1.61

(4) Gun as altered; with shoulder rest and bipod Range 1000 inches; M-2 tripod; 50 shots in 10 shot bursts.

	Max. Spread	Max. Horiz.	Max. Vert.
	1.65	1.45	1.20
	1.80	1.25	1.30
	2.60	2.50	1.00
	2.10	2.10	1.35
	1.85	1.35	1.50
Average	1.94	1.73	1.27

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(5) Gun as altered, shoulder rest and bipod removed, Range 1000 inches, M-2 tripod, 50 shots in 10 shot bursts.

	Max. Spread	Max. Horiz.	Max. Vert.
	2.00	2.00	1.10
	1.65	1.55	1.15
	2.20	2.20	1.80
	1.60	1.70	1.00
	1.40	1.30	1.20
Average	1.77	1.75	1.25

(6) Gun as altered; Range 1000 inches; Off shoulder, 40 shots in 5 shot bursts.

	Max. Spread	Max. Horiz.	Max. Vert.
	3.50	3.50	.60
	1.90	1.70	1.45
	1.90	.80	1.80
	1.45	.80	1.40
	2.25	1.45	1.95
	2.05	1.35	1.80
	1.80	1.20	1.20
	1.80	1.90	.50
Average	2.09	1.59	1.31

(6) (a) As a basis for comparison groups were fired with an M1919A4 mounted in the M-2 tripod with the following average characteristics:

5 round groups.

Max. Spread	Max. Horiz.	Max. Vert.
2.78	2.09	1.91

(b) Report of Test No. 1138 shows a similar test with the following group characteristics:

10 round groups.

Max. Spread	Max. Horiz.	Max. Vert.
2.44	2.03	2.25

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9. Test No. 2.

a. Purpose: To determine the cyclic rate of the subject gun as received and as altered.

b. Method: By firing and timing.

c. Results:

(1) Gun as received.

1st burst of 20 shots	-	3.4 sec
2nd burst of 20 shots	-	3.6 sec
3rd burst of 20 shots	-	3.5 sec
Average	-	3.5 sec.

$$\text{Cyclic rate} = \frac{20 \text{ (no of shots)}}{3.5 \text{ (Av. elapsed time)}} \times 60 = 342 \text{ shots per minutes}$$

(2) Gun as altered.

1st burst of 20 shots	-	3.2 sec
2nd burst of 20 shots	-	3.2 sec
3rd burst of 20 shots	-	3.2 sec
Average	-	3.2 sec.

$\frac{20}{3.2} \times 60 = 375$ shots per minute.

(3) In either case single shots were very easily fired.

10. Test No. 3.

a. Purpose: To determine the "belt pull" of the subject gun as received and as altered.

b. Method: The gun was mounted horizontally high above the ground and various belt loads tested.

c. Results:

(1) Gun as received.

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(a) With 50 rounds suspended from the gun firing was continuous with a slight increase in rate as the ammunition was expended.

(b) With 60 rounds suspended from the gun the belt failed to close on the third shot.

(c) With 55 rounds suspended from the gun the rate was very slow on the first four rounds, increasing as the ammunition was expended.

(d) 50 rounds was considered the maximum "belt pull" in the horizontal position.

(2) Gun as altered.

(a) With 75 rounds suspended from the gun the belt failed to close on the second round.

(b) With 70 rounds suspended from the gun the belt failed to close on the second round.

(c) With 60 rounds suspended from the gun firing was continuous with a slight increase in rate as the ammunition was expended.

(d) With 65 rounds suspended from the gun the rate was very slow on the first three rounds, increasing as the ammunition was expended.

(e) 60 rounds was considered the maximum "belt pull" of the gun as altered.

11. Test No. 4.

a. Purpose: To determine the "belt pull" when the subject gun is used for antiaircraft firing.

b. Method: By mounting the gun at an angle of 45° and firing.

c. Results: Belt loads of more than 10 rounds caused the cartridges to catch on the side of the entrance to the receiver.

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13. Test No. 5.

a. Purpose: To observe the functioning of the subject gun.

b. Method: By recording stoppages.

c. Results:

(1) Gun No. 1.

Date	Rounds Fired	Stoppages
11/26/42	1103	none
11/27/42	300	none
12/ 1/42	450	none
	1853	none

(2) Gun No. 2.

Date	Rounds Fired	Stoppages
11/27/42	750	none
11/30/42	250	none
12/ 2/42	700	none
	1700	none

13. Test No. 6.

a. Purpose: To determine the accuracy life of the barrels of the subject guns.

b. Method: By firing until accuracy falls off. Tests were conducted at Aberdeen Proving Ground.

c. Results: Quoting letter, Infantry Liaison Officer, Aberdeen Proving Ground to the Chief of Infantry Section, Requirements Division, Army Ground Forces, November 18, 1942 (Infantry Board File IB-471.8):

"---- The two inclosed pictures of the bipod mount and modified barrel on the M1919A4 M.G. are forwarded for your files.

The endurance test that was being conducted on the light modified barrel was called off after about 5000 rounds had been

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fired. The resultant drop in muzzle velocity during this firing was 113 foot seconds, starting at 2738 fs and ending at 2625 fs. It was intended to fire through this barrel until a drop of 300 foot seconds had been reached, but the test was called off when it was determined that the life of this modified barrel would be about the same as our standard barrel."

VI CONCLUSION

14. The foregoing tests were conducted with a view to determining the "suitability to service" of the subject gun. Since it is a conversion of a standard and proven weapon, only the points of difference and their possible effect on the use of the gun were considered.

15. Gun As Received.

a. Accuracy.

(1) Off-shoulder firing with the shoulder rest and bipod was slightly inferior to firing from the M1917A1 mount.

(2) With the gun mounted in the M1917A1 mount, the shoulder rest and bipod have little effect on the accuracy of the firing.

b. Cyclic Rate. The cyclic rate of 342 rounds per minute permits firing of single rounds and is satisfactory.

c. Belt Pull.

(1) The belt pull of 50 rounds is satisfactory for ground firing.

(2) Antiaircraft firing will require that the assistant gunner hold and guide the ammunition into the receiver to prevent cartridges catching on the side of the receiver.

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d. Functioning. The gun as received functioned excellently. In the tests, 1853 rounds were fired through the gun without a functional stoppage.

16. a. Inspection of the subject guns prompted the alteration of one gun to include

(1) A redesign of the barrel sleeve to permit

(a) Withdrawal of the barrel without the sleeve catching on the receiver when stripping the gun,

(b) Insertion of the barrel without the sleeve catching on the front bearing when assembling,

(c) To permit withdrawal and insertion of the barrel from the front without stripping, and

(d) Adjustment of headspace from the front and elimination of marring the barrel locking spring notches.

(2) Redesign of the heads of the biped legs to prevent their dropping from the "folded back" position in carrying.

b. Such tests as were necessary were then conducted.

17. Altered Gun.

a. Accuracy.

(1) Off-shoulder firing was slightly superior to the firing with the gun as received from the M1917A1 mount.

(2) Firing from the M-2 tripod was equal to the firing with the gun as received from the M1917A1 mount.

(3) With the gun mounted in the M-2 tripod, the shoulder rest and biped had little effect on the accuracy of the gun.

b. Cyclic Rate.

(1) The cyclic rate was raised to 375 rounds per minute.

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(2) Single shots could be fired and automatic fire was slightly superior to the gun as received.

e. Belt Pull. The belt pull was increased to 20 rounds.

f. Functioning. The gun as altered expended 1750 rounds in the tests without a functional stoppage.

16. Additional faults were noted in the subject guns as received as follows:

a. The cover latch was found to operate so stiffly that both hands were required to unlatch it. This was corrected by replacing the spring with one having less arch and consequently less pressure.

b. Guns could not be mounted in the M1917A1 mount due to interference by the rivet in the bolt latch. This latch serves no purpose in the Infantry and was removed.

c. The shoulder rest was found to have sharp edges on the under side and the operators' hands were cut several times before the sharp edges were removed.

d. The cover catch spring on the cover pin should be eliminated. It is unnecessary in the Infantry.

e. The snap-ring for securing the front bearing is inefficient. It comes off too easily and one was lost during the tests. It should be replaced by lock nuts as shown in Appendix "C".

f. The carrying handle stop prevents the handle from being moved up to the front bearing for two man carry. It is unnecessary and should be eliminated.

VII CONCLUSIONS

19. The Test Section concludes that with changes as described in Paragraphs 16, 17 and 18, and "Appendix "B", and as

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shown in Appendices "C" and "D", the subject guns are suitable for service in the Infantry.

H. G. SYDENHAM,
Colonel, Infantry,
Chief of Test Section.

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GROUND REQUIREMENTS SECTION
HEADQUARTERS
ARMY GROUND FORCES
ARMY WAR COLLEGE
WASHINGTON, D. C.

GNRST-11/22351 Nov. 18, 1942

SUBJECT: Browning Machine Gun, Caliber .30, M1919A4, Modified with Bipod and Shoulder Rest.

TO: The President, The Infantry Board, Fort Benning, Ga.

1. The Chief of Ordnance advises that two (2) Browning Machine Guns, Caliber .30, M1919A4 modified with Bipod and Shoulder Rest are being shipped to the Ordnance Officer, Fort Benning, Georgia, for the Infantry Board.

2. These guns have been modified to conform substantially to the modification recommended by the Infantry Board in Infantry Board Reports No. 1155, dated October 3, 1940 and No. 1223, dated July 2, 1941, Subject: Bipod and Shoulder Rest for Light Machine Gun M1919A4.

3. Upon receipt of subject Guns, it is desired that necessary test be conducted to determine whether these guns are suitable for service as modified.

4. It is desired that report be submitted to reach this headquarters on or before December 1, 1942.

By command of Major General MOORE:

(Signed) W. F. KEAN,
Colonel, G. S. C.,
Executive
Ground Requirements Section

COPY

APPENDIX "A"

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IB-472.8(11-10-42) 1st Ind.

THE INFANTRY BOARD, Fort Benning, Georgia, November 20, 1942.
To: Chief of Test Section, The Infantry Board, Fort Benning, Ga.

1. It is requested that, when received, your section conduct the necessary tests to determine whether the modified guns are suitable for service.

2. It is desired that the tests be expedited and that report be rendered the Infantry Board on or before November 28, 1942.

3. Lt. Col. Rod Blair is the member of the Infantry Board charged with this project.

For the President:

E. A. CHAZAL,
Lt. Col., Infantry,
Acting Recorder.

APPENDIX "A"

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IB-472.5 November 28, 1942.

SUBJECT: Browning Machine Gun, Caliber .30, M1919A6.

TO: Chief, Ground Requirements Section,
Headquarters Army Ground Forces,
Army War College,
Washington, D. C.

1. Reference letter, (GNRQT-11/22321), November 16, 1942, subject Browning Machine Gun, Caliber .30, M1919A4, Modified with Bipod and Shoulder Rest.

2. The subject guns have been tested and found satisfactory with the following modifications:

a. Barrel Front Bearing (Essential)

(1) Redesign of barrel sleeve in accordance with Inclosure No. 1. This permits removal of the barrel from the front end and eliminat s carbon deposit in bearing. The barrel front bearing on the gun submitted for test is unsatisfactory due to the fact that it interferes with the rapid removal and replacement of the barrel (via back end) by catching on various projections.

(2) Eliminate snap ring and snap ring groove from barrel front bearing and replace with lock nut or nuts, locking against shoulder of bearing. Present snap ring was pulled off several times during tests. One was lost.

b. Bipod Legs (Essential). Redesign heads of bipod legs as shown in Inclosure No. 2. Present bipod legs, when in the "folded back" position, jar loose and fall loosely into firing position.

c. Shoulder Rest (Essential). Sharp edges of slot in underside of shoulder rest should be eliminated to prevent cutting of gunners hand.

d. Cover Latch (Essential). Replace cover latch spring with one have same pressure as that on the M1917 machine gun. Present spring is too deeply arched and both hands are required to move latch for opening cover or removing back plate.

e. Carrying Handle Stop (Desirable). Eliminate to permit one or two man carry.

COPY:

APPENDIX "B"

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f. Operating Handle Latch (Desirable). Remove operating handle Latch from all guns issued for infantry use.

3. Formal report of test is being prepared and will follow this letter.

For the President:

M. J. CUMMER,
Colonel, Infantry,
Director.

2 Incls.
#1 Drawing of Redesign of barrel sleeve.
#2 Drawing of Redesign of heads of bipod legs.

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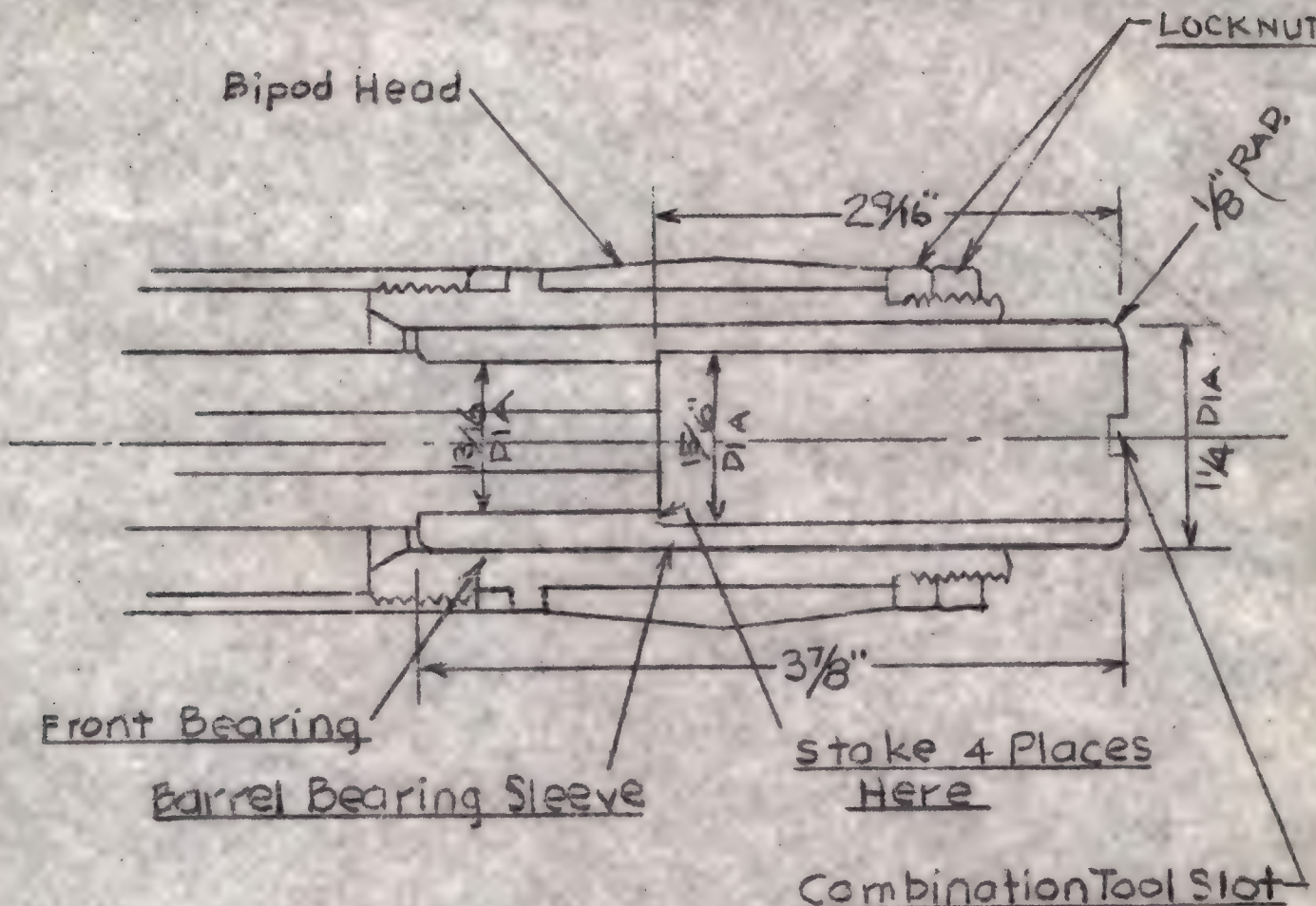

PROPOSED RE-DESIGN OF FRONT BEARING AND BARREL BEARING SLEEVE

INCLOSURE #1
APPENDIX "C"

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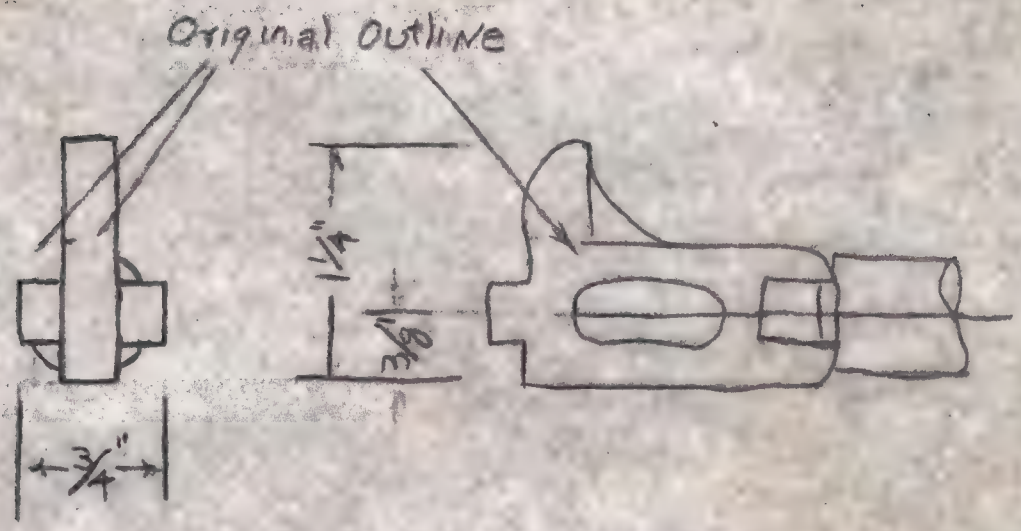

LOCKING LUG - BOTH SIDES

RE-DESIGNED HEAD OF BIPOD LEG

INCLOSURE #2

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Light Machine Gun M1919A6.

(M1919A4 modified with bipod and shoulder rest.)

NOTE: As received except that bolt latch has been removed.

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Light Machine Gun M1919A6.

(Disassembled)

A - M1919A4 LMG.
B - Shoulder Rest.
C - Bipod.
D - Snap Ring.

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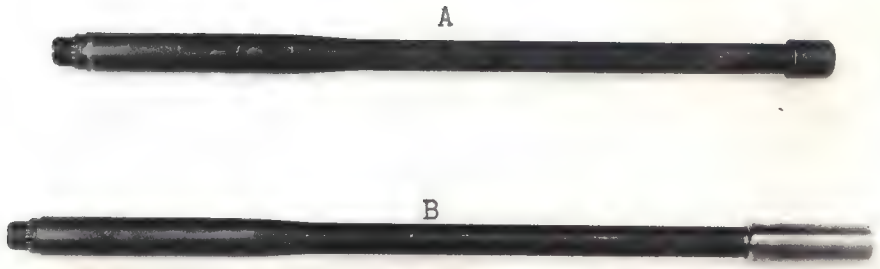

Barrel Alteration.

A - Barrel as received.
B - Barrel as altered.

Note longer sleeve on barrel B.

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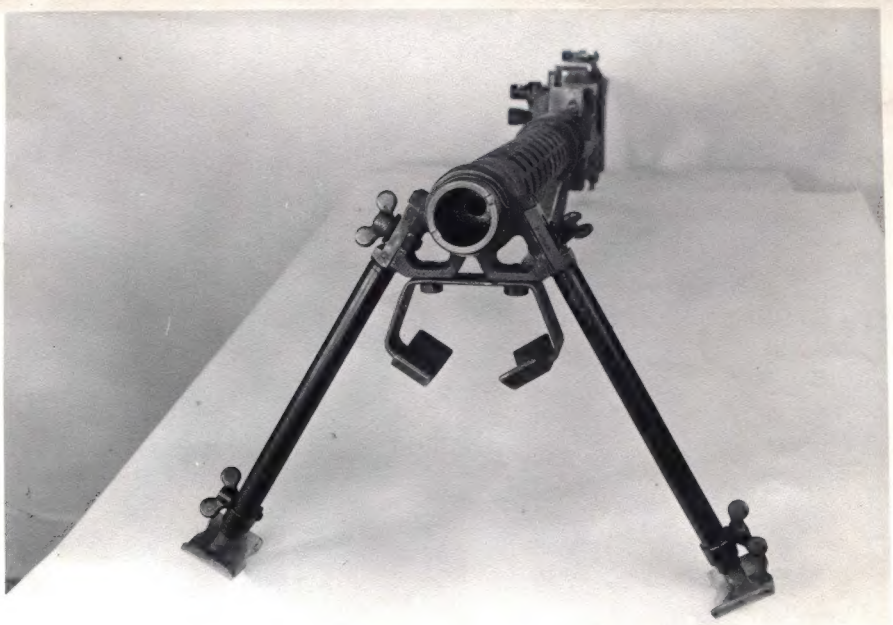

Gun as received.

Note location of muzzle of barrel in front bearing.

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Gun as altered.

Note barrel sleeve projecting from front bearing and slots for turning barrel.

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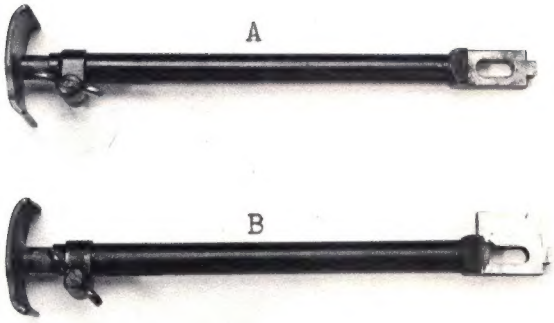

Bipod Legs.

A - As received.
B - As altered.

Note difference in heads.

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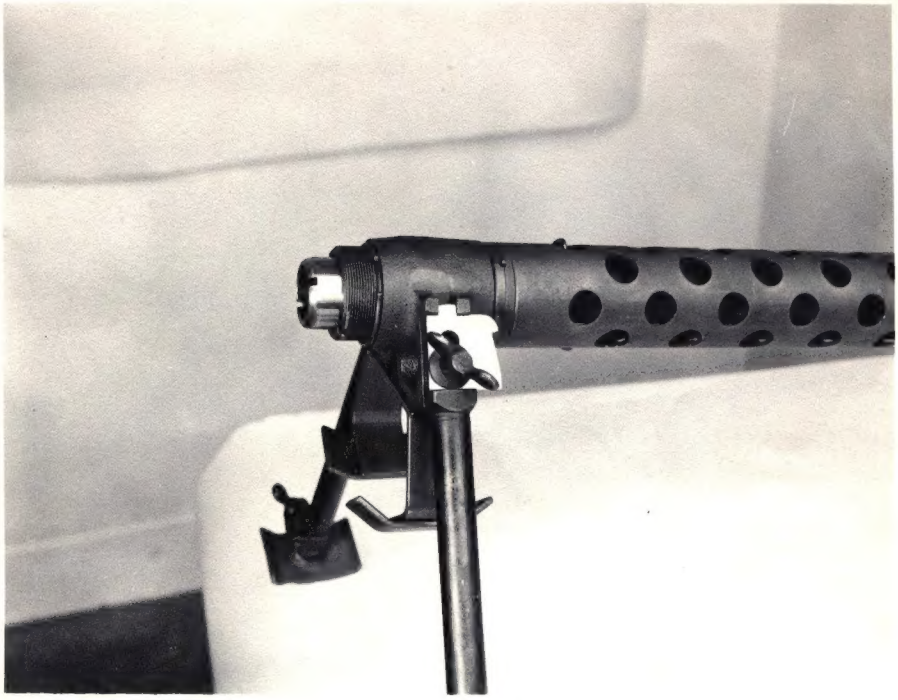

Gun as altered.

Note projecting barrel sleeve from front bearing, slots in barrel sleeve and bipod leg heads.